

and that the faculty of commerce should not be constituted, or regular teaching begin, until the following session.

THE Royal Commissioners for the Exhibition of 1851 have made the following appointments to science research scholarships for the year 1901, on the recommendation of the authorities of the several universities and colleges. The scholarships are of the value of 150*l.* a year, and are ordinarily tenable for two years (subject to a satisfactory report at the end of the first year) in any university at home or abroad, or in some other institution approved of by the Commissioners. The scholars are to devote themselves exclusively to study and research in some branch of science, the extension of which is important to the industries of the country:—J. A. Craw, University of Glasgow; F. Horton, University of Birmingham; A. Slator, University of Birmingham; R. B. Denison, Yorkshire College, Leeds; G. Owen, University College, Liverpool; G. Senter, University College, London; F. W. Rixon, Owens College, Manchester; T. Baker, Durham College of Science, Newcastle-on-Tyne; S. C. Laws, University College, Nottingham; Alice E. Smith, University College of North Wales, Bangor; J. Hawthorne, Queen's College, Belfast; R. K. McClung, McGill University, Montreal; C. W. Dickson, Queen's University, Kingston, Ontario; G. Harker, University of Sydney; Dr. J. M. MacLaren, University of New Zealand. The following scholarships granted in 1900 have been continued for a second year on receipt of a satisfactory report of work done during the first year:—C. E. Fawsitt, University of Edinburgh; V. J. Blyth, University of Glasgow; J. Moir, University of Aberdeen; Dr. W. M. Varley, Yorkshire College, Leeds; J. A. C. W. Humfrey, University College, Liverpool; S. Smiles, University College, London; Alice L. Embleton, University College of South Wales and Monmouthshire, Cardiff; J. A. Cunningham, Royal College of Science, Dublin; W. S. Mills, Queen's College, Galway; J. Patterson, University of Toronto; W. C. Baker, Queen's University, Kingston, Ontario; J. Barnes, Dalhousie University, Halifax, Nova Scotia; J. J. E. Durack, University of Sydney. The following scholarships granted in 1898 and 1899 have been exceptionally renewed for a third year:—L. N. G. Filon, University College, London; J. W. Mellor, University of New Zealand; F. W. Skirrow, Yorkshire College, Leeds; C. G. Barkla, University College, Liverpool; W. Campbell, Durham College of Science, Newcastle-upon-Tyne; L. Lownds, University College, Nottingham; Dr. J. T. Jenkins, University College of Wales, Aberystwyth; R. D. Abell, University College of North Wales, Bangor; B. D. Steele, University of Melbourne.

SCIENTIFIC SERIAL.

American Journal of Science, July.—Geology of the Shonkin Sag and Palisade Butte Laccoliths in the Highwood Mountains of Montana, by W. H. Weed and L. V. Pirsson.—On the manganese ore deposits of the Queluz (Lafayette) district, Minas Geraes, Brazil, by O. A. Derby.—On the bituminous deposits situated at the south and east of Cardenas, Cuba, by H. E. Peckham. On the north of Cuba there is a tract of country more than 4500 square miles in area, the springs and wells of which give indications of the existence of liquid bitumens of varying density. The oil which has been obtained resembles the oils of Russia, but it is doubtful if, in view of the enormous production which recent developments in Texas and Indiana promise, there is at present any encouragement for even experimental drilling in Cuba.—Mineralogical notes, No. 2, by A. F. Rogers. A description of new types of calcite and galena, together with a note of new localities for some rare minerals.—A new solution for the copper voltameter, by W. K. Shepard. A saturated solution of copper sulphate is boiled for a short time to expel the air and then kept for about an hour at 100° C. in contact with metallic copper in order to neutralise the solution. About 0.5 per cent. of ammonium chloride was then added. Using this solution it was found that the weight of copper was practically independent of the temperature between 20° and 40° C; the solution may be used a large number of times, and the results are independent of the current density between the limits of 0.2 and 0.7 ampere per square centimetre.—The thermomagnetic and galvanomagnetic effects in tellurium, by M. G. Lloyd.—Additions to the avifauna of the Bermudas, with diagnoses of two new subspecies, by A. H. Verrill.—The induced alternating current discharge studied with reference to its spectrum and especially its ultra-violet spectrum, by A. W. Wright and E. S. Downs.

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SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, May 23.—“Preliminary Statement on the Prothalli of *Ophioglossum pendulum* (L.), *Helminthostachys zeylanica* (Hook.), and *Psilotum*, sp.” By William H. Lang, M.B., D.Sc., Communicated by Prof. F. O. Bower, F.R.S.

During a recent visit to Ceylon and the Malay Peninsula, the author found prothalli of *Ophioglossum pendulum* and *Helminthostachys zeylanica* as well as a single specimen, which there is reason to regard as the prothallus of *Psilotum*. This paper gives a brief account of the mode of occurrence and external form of these three prothalli.

Ophioglossum pendulum. The prothalli were found in the humus collected by an epiphytic fern. They were wholly saprophytic, devoid of chlorophyll and of a yellowish-white colour. An endophytic mycorrhiza is present in them. The prothallus is radially symmetrical, the older ones consisting of a number of short cylindrical branches radiating in all directions into the humus. The surface of these branches is covered with short unicellular hairs (paraphyses); rhizoids are absent. The antheridia and archegonia, which occur on the same prothallus, resemble those of *O. pedunculatum*.

Helminthostachys zeylanica. The wholly saprophytic prothalli of this plant occur about two inches below the surface of the ground. They are radially symmetrical; the lower vegetative half, in which is an endophytic fungus, is more or less lobed and bears rhizoids. The sexual organs are borne on the upper half; the antheridia are large and sunk beneath the surface; the archegonia project slightly from it. Sometimes the prothalli are monœcious, but more often a prothallus bears antheridia or archegonia only. The ternate lamina of the first leaf of the young plant is green and appears above ground.

Psilotum. A single prothallus, presumably belonging to this plant, was found embedded among the roots covering the stem of a tree-fern. It was one-quarter of an inch long and presented a general resemblance to some prothalli of *Lycopodium*, having a well-marked primary tubercle. The sexual organs were borne on the overhanging margin of the upper region of the prothallus, between which and the lower vegetative region the meristem will probably be found to be situated.

June 20.—“The Mechanism of the Electric Arc.” By (Mrs.) Hertha Ayrton. Communicated by Prof. Perry, F.R.S.

The object of the paper is to show that, by applying the ordinary laws of resistance, of heating and cooling and of burning to the arc, considered as a gap in a circuit furnishing its own conductor by the volatilisation of its own material, all its principal phenomena can be accounted for, without the aid of a large back E.M.F., or of a “negative resistance,” or of any other unusual attribute.

The Apparent Large Back E.M.F.

It is shown how volatilisation may begin, even without the self-induction to which the starting of an arc, when a circuit is broken, is usually attributed; and it is pointed out that, when the carbons are once separated, all the material in the gap cannot retain its high temperature. The air must cool some of it into carbon mist or fog, just as the steam issuing from a kettle is cooled into water mist at a short distance from its mouth. The dissimilar action of the poles common to so many electric phenomena displays itself in the arc at this point. Instead of both poles volatilising the positive pole alone does. It is considered, therefore, that the arc consists of (1) a thin layer of carbon vapour issuing from the end of the positive carbon, (2) a bulb of carbon mist joining this to the negative carbon, and (3) a sheath of burning gases, formed by the burning of the mist, and the hot ends of the carbons, and surrounding both. The vapour appears to be indicated in images of the arc by a sort of gap between the arc and the positive carbon, the mist by a purple bulb and the gases by a green flame.

The flame is found to be practically insulating, so that nearly the whole of the current flows through the vapour and mist alone. It is suggested that the vapour has a high specific resistance compared with that of the mist, and that it is to the great resistance of this vapour-film that the high temperature of the crater is due, and not to any large back E.M.F. of which it is the seat.

Volatilisation can only take place at the surface of contact between the vapour-film and the positive carbon. When that surface is smaller than the cross-section of the end of the carbon it must dig down into the solid carbon and make a pit. The sides of the pit, however, must be hot enough to burn away where the air reaches them, hence there is a race between the volatilisation of the centre of the carbon and the burning of its sides that determines the shape of the carbon. When the arc is short, the air cannot get so easily to the sides of the pit, hence it remains concave. When the arc is long, the burning of the sides gains over the volatilisation of the centre, and the surface of volatilisation becomes flat, or even slightly convex.

The peculiar shaping of the negative carbon is shown to be due to its tip being protected from the air by the mist and its sides being burnt away under the double action of radiation from the vapour film and conduction from the mist, to a greater or less distance, according to the length of the arc and the cross-section of the vapour-film.

It is shown that if the crater be defined as being that part of the positive carbon that is far brighter than the rest, then the crater must be larger, with the same current, the longer the arc, although the area of the volatilising surface is *constant* for a constant current.

By considering how the cross-section of the vapour-film must vary with the current and the length of the arc, it is found that its resistance f must be given by the formula

$$f = \frac{h}{A} + \frac{k + m}{A^2},$$

where h , k and m are constants, l is the length of the arc, and A the current. This is the same form as was found by measuring the P.D. between the positive carbon and the arc by means of an exploring carbon and dividing the results by the corresponding currents. Hence the existence of a thin film of high-resisting vapour in contact with the crater would not only cause a large fall of potential between the positive carbon and the arc, exactly as if the crater were the seat of a large back E.M.F., but it would cause that P.D. to vary with the current and the length of the arc exactly as it has been found to vary by actual measurement.

The Apparent "Negative Resistance."

As nearly all the current flows through the vapour and mist, the surrounding flame being practically an insulator, the resistance of a solid carbon arc, apart from that of the vapour, must depend entirely on the cross-section of the mist. To see how this varies with the current, images of an arc of 2 mm. were drawn, with the purple part—the mist—very carefully defined, for currents of 4, 6, 8, 10, 12 and 14 amperes. The mean cross-section of the mist was found to increase more rapidly than the current, consequently its resistance diminishes more rapidly than the current increases. As the formula for the resistance of the vapour film shows that it too diminishes faster than the current increases, it follows that the whole resistance of the arc does the same, and that consequently the P.D. must diminish as the current increases. Hence if δV and δA be corresponding increments of P.D. and current, $\delta V/\delta A$ must be negative, although the resistance of the arc is positive.

It is found, from the above measurements of the cross-sections of the mist, that the connection between m , the resistance of the mist, and the current, is of the form,

$$m = \frac{\alpha}{A} + \frac{\beta}{A^2}.$$

If m varies directly with the length of the arc, then

$$m = \left(\frac{\alpha}{A} + \frac{\beta}{A^2} \right) l.$$

Adding this equation to (1), we get

$$f + m = r = \frac{p + ql}{A} + \frac{s + tl}{A^2}$$

for the whole resistance of the arc, which is exactly the form that was found by dividing direct measurements of the P.D. between the carbons by the corresponding currents. Hence there is no reason why this ratio should not represent the *true* resistance of the arc.

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Under what circumstances $\delta V/\delta A$ measures the True Resistance of the Arc.

When the current is changed it takes some time for the vapour film to alter its area to its fullest extent, and still more time for the carbon ends to change their shapes. All the time these changes are going on the resistance of the arc, and, consequently, the P.D. between the carbons, must be altering also. Both these, therefore, depend, not only on the current and the length of the arc, but also, till everything has become steady again, *i.e.* till the arc is "normal" again, on how lately a change has been made in either. At the first instant after a change of current, before the volatilising area has had time to alter at all, δV and δA must have the same sign, just as they would if the arc were a wire, but as the volatilising surface alters, the sign of δV changes. If, therefore, a small alternating current is applied to the direct current of an arc, it will depend on the frequency of that current whether $\delta V/\delta A$ is positive or negative. When the frequency is so high that the volatilising surface never changes at all, $\delta V/\delta A$ will measure the true resistance of the arc unless it has a back E.M.F. which varies with the alternating current.

The measurements of the true resistance of the arc made in this way by various experimenters have given very various results, because probably the frequency of the alternating currents employed has been too low not to alter the resistance of the arc. A curve is drawn showing how the value of $\delta V/\delta A$ with the same direct current and length of arc varies with the frequency of the alternating current, and it is pointed out that even if the arc has as large a back E.M.F. as is usually supposed, the *true* resistance cannot be measured with an alternating current of lower frequency than 7000 complete alternations per second.

The exact conditions under which the *true* resistance of the arc can be measured in this way are examined, and the precautions that it is necessary to take to ensure the fulfilment of these conditions are enumerated.

The Changes introduced into the Resistance of the Arc by the Use of Cored Carbons.

A core in either or both carbons has a great effect on both the P.D. between the carbons and the *change* of P.D. that accompanies a given *change* current. It lowers the first and makes the second more positive, *i.e.* gives it a smaller negative or larger positive value, as the case may be. It is pointed out that this might be due to the influence of cores either on the cross-section of the arc or on its specific resistance, or on both.

To see the effect on the cross-section, enlarged images were drawn of 2 mm. arcs with currents increasing by 2 amperes from 2 to 14 amperes, between four pairs of carbons, + solid - solid, + solid - cored, + cored - solid, + cored - cored. Two sets of images were drawn with each pair of carbons—the one immediately after a change of current, to get the "non-normal" change, and the other after the arc had become normal again. The mean cross-section of the mist was calculated in each case, and its cross-section where it touched the crater was taken to be a rough measure of the cross-section of the vapour film.

It was found that the mean cross-section of the mist with a given current was largest when both carbons were solid, less when the negative carbon alone was cored, less still when the positive alone was cored, and least when both were cored. Coring either the positive carbon alone, or both carbons, had the same effect on the cross-section of the vapour film as on that of the mist, but coring the negative alone only diminished this cross-section immediately after a change of current, but not when the arc had become normal again. Hence it was deduced that if the cores altered the *cross-sections* of the arc only they would *increase* its resistance, and, consequently, the P.D. between the carbons. As they *lower* this, however, they must do it by lowering the specific resistance of the arc more than they increase its cross-section. The vapour and mist of the core must therefore have lower specific resistances than the vapour and mist of the solid carbon.

When it is the positive carbon that is cored, all the vapour and mist come from the *cored* carbon. When the negative, they come from the *uncored* carbon, and it is only because the metallic salts in the core have a lower temperature of volatilisation than carbon that the mist is able to volatilise these and so lower its own specific resistance.

The effect of a core in either carbon, or in both, must depend

on the current, because the larger the current the more solid carbon will the volatilising surface cover, and the less, therefore, will the specific resistances of the mist and vapour be lowered. The way in which the core acts in each case is traced, and the alterations in the specific resistances and cross-sections due to the core are shown to bring about changes in the P.D. exactly similar to those found by actual measurements of the P.D. between the carbons. It is shown, for instance, how these changes entirely account for the fact established by Prof. Ayrton (Electrical Congress at Chicago, 1893) that, with a constant length of arc, while the P.D. diminishes continuously as the current increases, when both carbons are solid, it sometimes remains constant over a wide range of current, or even increases again, after having diminished, when the positive carbon is cored.

The alterations in the value of $\delta V/\delta A$ introduced by the cores are next discussed, and it is shown that the changes in the resistance of the arcs that *must* follow the observed changes in its cross-section, coupled with the alterations that must ensue from the lowering of its specific resistance, would modify $\delta V/\delta A$ just in the way that Messrs. Frith and Rodgers ("The Resistance of the Electric Arc," *Phil. Mag.* 1896, vol. xlii. p. 407) found that it was modified by direct measurement. Thus all the principal phenomena of the arc, with cored and with solid carbons alike, may be attributable to such variations in the specific resistances of the materials in the gap as it has been shown *must* exist, together with the variations in the cross-sections of the arc that have been observed to take place. Hence it is superfluous to imagine either a large back E.M.F. or a "negative resistance."

"The Nature and Origin of the Poison α . *Lotus arabicus*." By Wyndham R. Dunstan, M.A., F.R.S., Director of the Scientific and Technical Department of the Imperial Institute, and T. A. Henry, B.Sc., Salters' Company's Research Fellow in the Laboratories of the Imperial Institute.

The authors have already given a preliminary account (*Roy. Soc. Proc.*, vol. lxvii. p. 224, 1900) of this investigation and have shown that the poisonous property of this Egyptian vetch is due to the prussic acid which is formed when the plant is crushed with water, owing to the hydrolytic action of an enzyme, *lotase*, on a glucoside, *lotusin*, which is broken up into hydrocyanic acid, dextrose and lotoflavin, a yellow colouring matter.

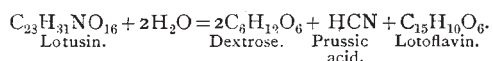
The authors have continued the investigation with the object of ascertaining the properties and chemical constitution of lotoflavin and of lotusin, and also of studying the properties of lotase in relation to those of other hydrolytic enzymes.

Lotusin.

Lotusin can be separated from an alcoholic extract of the plant by a tedious process giving a very small yield, about 0.025 per cent.

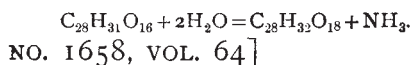
Lotusin is a yellow crystalline glucoside, more soluble in alcohol than in water. When heated it gradually decomposes without exhibiting any fixed melting point. Combustions of specially purified material gave numbers agreeing with those deduced from the formula $C_{23}H_{31}NO_{16}$.

In the preliminary notice the formula $C_{22}H_{19}NO_{10}$ was provisionally assigned to lotusin on the assumption that one molecule of dextrose is formed by its hydrolysis. The formula given above, as the result of ultimate analysis, is confirmed by the observation that two molecules of dextrose are produced by acid hydrolysis, which is therefore represented by the equation—

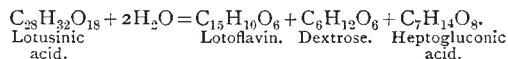


When a solution of lotusin is warmed with dilute hydrochloric acid, hydrolysis readily occurs. The liquid acquires a strong odour of hydrocyanic acid and a yellow crystalline precipitate of lotoflavin is thrown down, whilst the solution strongly reduces Fehling's solution. Dilute sulphuric acid only very slowly effects the hydrolysis of lotusin.

When warmed with aqueous alkalis, lotusin is gradually decomposed, ammonia being evolved and an acid formed to which the name *lotusinic acid* has been given.



Lotusinic acid is a monobasic acid furnishing yellow crystalline salts. It is readily hydrolysed by dilute acids forming lotoflavin, dextrose and heptogluconic acid (dextrose-carboxylic acid):



With the exception of amygdalin, lotusin is the only glucoside definitely known which furnishes prussic acid as a decomposition product.

Lotoflavin.

Lotoflavin is a yellow crystalline colouring matter readily dissolved by alcohol or by hot glacial acetic acid, and also by aqueous alkalis forming bright yellow solutions. It is always present to some extent in the plants, especially in old plants. Ultimate analysis leads to the formula $C_{15}H_{10}O_6$. It is therefore isomeric with luteolin, the yellow colouring matter of *Reseda luteola*, and with *fisetin*, the yellow colouring from young fustic, *Rhus cotinus*. *Morin*, from *Morus tinctoria*, appears to be hydroxylotoflavin.

Lotoflavin does not form compounds with mineral acids. It furnishes a tetracetyl derivative and two isomeric mutually convertible trimethyl ethers which are capable of forming one and the same acetyl-trimethyl-lotoflavin. By the action of fused potash lotoflavin is converted into phloroglucin and β -resorcylic acid.

Dextrose.

The sugar resulting from hydrolysis has been found to correspond in all properties with ordinary dextrose.

Hydrocyanic acid.

The amount of prussic acid given by plants at different stages of growth has been ascertained. Mature plants bearing seed-pods have furnished 0.345 per cent. of this acid, calculated on the air-dried material which corresponds with 5.23 per cent. of lotusin. Younger plants bearing flower buds gave 0.25 per cent., whilst still smaller quantities were furnished by very young plants and hardly any by quite old plants from which the seeds had fallen.

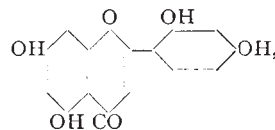
The formation of the poison, therefore, seems to reach its maximum at about the seeding period, and after this period to diminish rapidly. The Arabs are aware that the plant is safe to use as a fodder when the seeds are quite ripe, but not before. We have found that it is the lotusin which disappears during the ripening of the seeds. Old plants contain some lotase and lotoflavin, but little or no lotusin.

Lotase.

In its general properties lotase resembles other hydrolytic enzymes, from which, however, it differs in several important respects. It may be compared with emulsin, the enzyme of bitter almonds. Emulsin, however, only attacks lotusin very slowly, whilst lotase has but a feeble action on amygdalin, the glucoside of bitter almonds. Lotase is much more readily injured and deprived of its hydrolytic power than emulsin. On this account it is difficult to isolate in the solid state. Its power is not only rapidly abolished by heat, but is also gradually destroyed by contact with alcohol or glycerine. Besides lotase, the plant contains an amylolytic and a proteolytic enzyme.

Constitution of Lotoflavin and Lotusin.

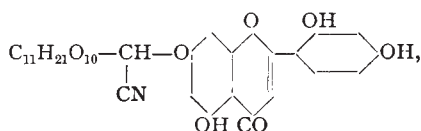
Having regard to its reactions and especially to the production, by the action of fused alkali, of β -resorcylic acid and phloroglucin, the authors conclude that lotoflavin should be represented by the formula



which is that α . a compound belonging to the same class, of phenylated pheno- γ -pyrones, as its isomerides luteolin and fisetin. The peculiarity shown by lotoflavin of containing four hydroxyl groups, but furnishing only a trimethyl ether, is

accounted for by one of the hydroxyl groups being in the ortho position to a carbonyl group.

The reactions of lotusin are best represented by the formula :



which is that of a lotoflavin ether of maltose-cyanhydrin.

This formula satisfactorily accounts for the partial hydrolysis of the glucoside by alkalis giving lotusinic acid and ammonia, and for the decomposition of the substance by acids giving lotoflavin and maltose-carboxylic acid which is immediately decomposed into dextrose and heptogluconic acid. It also accounts for the hydrolysis of lotusin, by acids, into lotoflavin and maltose, which is further changed to dextrose.

In order to definitely localise the position of the cyanogen group in lotusin, the behaviour of several cyanhydrins of known constitution have been examined with reference to the question as to whether they would furnish hydrocyanic acid when acted on by dilute hydrochloric acid. It was found that mandelic nitrile, lævulose cyanhydrin and pentacetyl gluconitrile, in which the cyanogen group is known to occupy a position similar to that assumed for it in the formula suggested for lotusin, are, like lotusin, easily decomposed by dilute hydrochloric acid forming prussic acid and the corresponding aldehyde or ketone.

The authors wish again to express their obligations to Mr. Ernest A. Floyer, of Cairo, Member of the Egyptian Institute, who has spared neither trouble nor expense in collecting in Egypt, and despatching to this country, the material required for this investigation.

PARIS.

Academy of Sciences, July 29.—M. Fouqué in the chair.—On the cooling power of a gaseous or liquid current, by M. J. Boussinesq.—On the variation in luminosity of the planet Eros; duration of the period, by M. Ch. André. As the mean result of a series of measurements carried out by three independent observers at the observatory of Lyons, the period between two consecutive minima is found to be 5h. 16m. 15.2s. It was found that the observations of the minima could be more accurately made than those of the maxima.—On surfaces susceptible of a continuous deformation with conservation of a conjugated system, by M. A. Demoulin.—On the analytical integrals of differential equations of the first order and of any degree in the neighbourhood of certain singular values, by M. Henri Dulac.—On the infinitely small deformation of an elastic body submitted to known forces, by MM. Eugène and François Cosserat.—On the vibrations of liquid films of determinate forms, by MM. Chéneveau and G. Cartaud. An experimental study by a photographic method of the wave figures produced on the surface of liquids contained in vessels of different forms.—On the radio-activity of radium salts, by MM. P. Curie and A. Debierne. A study of the conditions under which a radio-active salt can impart active properties to water. A solution of a radium salt exposed in an open vessel steadily loses its active properties, the rate of loss being proportional to the surface exposed to the air. But if this solution is kept in a sealed tube it gradually acquires its original activity.—A geographical demonstration of the terrestrial origin of the polar aurora, by M. Henri Stassano. All the facts cited are in accord with the theory of De la Rive.—On the continuity of the spectra due to solids and to incandescent liquids, by M. L. Décombe.—On the electrocapillary action of molecules not dissociated into ions, by M. Gouy.—On the solubility of mixtures of sulphate of copper and sulphate of soda, by MM. Massol and Maldès. Solutions obtained with a mixture of the sulphates of soda and copper, the two salts being in excess, possess an invariable composition at ordinary temperatures, but if the temperatures are sufficiently high to produce the anhydrous modification of sodium sulphate, the composition of the solution varies with the relative proportion of the two salts present.—On the chloride of neo-didymium, by M. Camille Matignon. Details are given of a simple method of preparation of the anhydrous chloride, and also of a new hydrate.—Study of the alloys of aluminium and molybdenum, by M. Leon Guillet. The reduction of molybdic acid by

aluminium gives rise to no less than six compounds corresponding to the formulæ Al_2Mo , Al_3Mo , Al_4Mo , AlMo_2 , AlMo_3 , and a compound very rich in molybdenum, perhaps AlMo_{20} .—The crystallisation of cerium oxide, by M. Jean Sterba. The crystallisation of cerium oxide can be effected from sodium chloride, borax and potassium sulphate. It forms cubes or octahedra which are colourless and transparent.—Contribution to the study of caesium, by M. C. Chabrie. A description of the sulphites and hyposulphites of cerium.—On the pyrogallol sulphonic acids, by M. Marcel Delage.—The action of ethyl alcohol upon barium ethylate. The synthesis of normal butyl alcohol, by M. Marcel Guerbet. By heating a strong solution of barium ethylate in ethyl alcohol in a sealed tube at 240°C ., a small quantity of normal butyl alcohol is produced along with ethylene and hydrogen.—On the composition of the albumen of the seed of *Phoenix canariensis* and on the chemical phenomena which accompany the germination of this seed, by MM. E. Bourquelot and H. Herissey.—On the histological constitution of the retina in congenital absence of the brain, by MM. N. Vaschide and Cl. Vurpas.—Cultures and attenuated forms of the cryptogamic diseases of plants, by M. Julien Ray.—On the affinity of the red corpuscles of the blood for acids and alkalis and on the variations of resistance which they impress upon these reagents towards solanine, by M. E. Hédon.—On the nitrogenous nutrition of yeast, by M. Pierre Thomas.—The influence of lecithin upon the nutritive exchanges, by M. G. Carriere.

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